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PTO/SB/05 (12/97)

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b)

| Attorney Docket No. 42390.P8085 | Total Pages 3 |
|---|---------------|
| First Named Inventor or Application Identifier Kelan C. Silvester | |
| Express Mail Label NoEL431890121US | |

ADDRESS TO: Assistant Commissioner for Patents Box Patent Application Washington, D. C. 20231

| | APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents. | | | | | |
|----|---|---|--|--|--|--|
| 1. | _X_ | Fee Transmittal Form (Submit an original, and a duplicate for fee processing) | | | | |
| 2. | <u>X</u> | Specification (Total Pages) (preferred arrangement set forth below) - Descriptive Title of the Invention - Cross References to Related Applications - Statement Regarding Fed sponsored R & D - Reference to Microfiche Appendix - Background of the Invention - Brief Summary of the Invention - Brief Description of the Drawings (if filed) - Detailed Description - Claims - Abstract of the Disclosure | | | | |
| 3. | <u>X</u> | Drawings(s) (35 USC 113) (Total Sheets 2) | | | | |
| 4. | _X_ | Oath or Declaration (Total Pages <u>3</u>) a. <u>X</u> Newly Executed (Original or Copy) | | | | |
| | | b Copy from a Prior Application (37 CFR 1.63(d)) (for Continuation/Divisional with Box 17 completed) (Note Box 5 below) | | | | |
| | | i. <u>DELETIONS OF INVENTOR(S)</u> Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b). | | | | |
| 5. | | Incorporation By Reference (useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein. | | | | |
| 6. | | Microfiche Computer Program (Appendix) | | | | |

| 7. | a b c | Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) Computer Readable Copy Paper Copy (identical to computer copy) Statement verifying identity of above copies | |
|-----------------|-------------------------|---|--|
| | | ACCOMPANYING APPLICATION PARTS | |
| 8. 9. | _X | Assignment Papers (cover sheet & documents(s)) a. 37 CFR 3.73(b) Statement (where there is an assignee) | |
| | | b. Power of Attorney | |
| 10. | | English Translation Document (if applicable) | |
| 11. | | a. Information Disclosure Statement (IDS)/PTO-1449 | |
| | | b. Copies of IDS Citations | |
| 12. | | Preliminary Amendment | |
| 13. | _X | Return Receipt Postcard (MPEP 503) (Should be specifically itemized) | |
| 14. | | a. Small Entity Statement(s) | |
| | | b. Statement filed in prior application, Status still proper and desired | |
| 15. | | Certified Copy of Priority Document(s) (if foreign priority is claimed) | |
| 16. | <u>X</u> | Other: Certificate of Mailing | |
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FEE CALCULATION (continued) 3. ADDITIONAL FEES Large Entity **Small Entity** Fee Fee Fee Fee Code (\$) Code (\$) **Fee Description** Fee Paid 105 130 205 Surcharge - late filing fee or oath 65 Surcharge - late provisional filing fee 127 50 227 25 or cover sheet Non-English specification 139 139 130 130 147 2,520 147 For filing a request for reexamination 2,520 920* Requesting publication of SIR prior to 112 920* 112 **Examiner action** 113 1,840* 1,840* Requesting publication of SIR after 113 **Examiner action** 115 Extension for response within first month 110 215 55 116 380 216 190 Extension for response within second month 117 870 217 435 Extension for response within third month 118 1,360 218 680 Extension for response within fourth month 128 1,850 228 925 Extension for response within fifth month 119 219 150 300 **Notice of Appeal** 120 300 220 150 Filing a brief in support of an appeal 121 260 221 130 Request for oral hearing Petition to institute a public use proceeding 138 1,510 138 1,510 140 110 240 55 Petition to revive unavoidably abandoned application 141 1,210 241 605 Petition to revive unintentionally abandoned application 1,210 142 242 605 Utility issue fee (or reissue) 143 430 243 Design issue fee 215 144 580 244 290 Plant issue fee 122 130 122 130 **Petitions to the Commissioner** 123 123 50 Petitions related to provisional applications 50 126 240 126 240 **Submission of Information Disclosure Stmt** 581 40 581 40 Recording each patent assignment per property (times number of properties) 40.00 146 760 246 380 For filing a submission after final rejection (see 37 CFR 1.129(a)) 149 760 380 249 For each additional invention to be examined (see 37 CFR 1.129(a)) Other fee (specify) Other fee (specify) SUBTOTAL (3) \$ 40.00 *Reduced by Basic Filing Fee Paid SUBMITTED BY: Typed or Printed Name: David Kaplan 12/22/99 Signature Date Reg. Number <u> 4/1,105</u> Deposit Account User ID (complete if applicable)

UNITED STATES PATENT APPLICATION

FOR

NOTEBOOK COMPUTER WITH INDEPENDENTLY FUNCTIONAL, DOCKABLE CORE COMPUTER

inventor:

Kelan C. Silvester

Prepared by:

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, LLP 12400 Wilshire Boulevard Los Angeles, CA 90025-1026

Attorney Docket No.: 42390.P8085

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NOTEBOOK COMPUTER WITH INDEPENDENTLY FUNCTIONAL, DOCKABLE CORE COMPUTER

The present invention relates to computer systems and more particularly to a computer system having a docking port that receives an electronic device comprising a processor and providing independent functionality.

BACKGROUND

Notebook computers, including laptops, sub-notebooks, and other mobile computers that include a keyboard and display, are becoming increasingly pervasive in our society. Notebook computers are also becoming increasingly powerful, able to effortlessly run applications that include presentation graphics, spreadsheets, and word processors. Unfortunately, notebook computers may be unnecessarily large and heavy for certain applications. For example, a notebook computer may include applications to schedule appointments in an electronic calendar or to store names and numbers in an electronic address book. If a user intends to use only these applications during a particular period of time, a good portion of the bulk of a typical notebook computer may be superfluous. Instead, all that may be needed is a small, hand-held device such as a personal data assistant (PDA).

Unfortunately, to realize the advantages of both a PDA for running simple applications and a notebook computer for running more advanced applications, a user must purchase one of each. Much of the electronics contained in a PDA and in a notebook computer, however, is redundant.

BRIEF DESCRIPTION OF THE DRAWINGS

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The present invention is illustrated by way of example and not limitation in the accompanying figures in which like references indicate similar elements and in which:

Figure 1 is a computer system and undocked electronic device formed in accordance with an embodiment of the present invention;

Figure 2 is a schematic diagram of the computer system and electronic device of Figure 1 when the electronic device is docked in the computer system.

DETAILED DESCRIPTION

In accordance with an embodiment of the present invention, a notebook computer includes a docking port (or bay) to receive a core computer. The processor of the core computer serves as the system processor for the notebook computer when the core computer is docked in the notebook computer. When the core computer is undocked, the processor serves as the system processor for the core computer. The core computer includes memory containing a mini operating system to be booted when undocked, and the notebook computer includes memory containing a full operating system to be booted when the core computer is docked. When the core computer is docked, the notebook computer memory is synchronized with the core computer memory, a battery in the core computer is charged, and the processor runs at a higher frequency and higher voltage than when the core computer is undocked.

A more detailed description of embodiments of the present invention, including various configurations and implementations, is provided below.

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As used herein, the term "when" is intended to mean during all or some portion of time within the period of time that satisfies a condition, as opposed to the term "whenever" which is intended to mean during the entire period of time that satisfies a condition. For example, the statement that a computer charges the battery of a device when the device is docked is intended to mean that the battery may be charged during all or some portion of the period of time during which the device is docked. The term "data" is used herein to describe data, instructions, addresses, or any other information that can be represented by one or more bits.

Figure 1 is a notebook computer 100 and undocked electronic device 101 formed in accordance with an embodiment of the present invention. Notebook computer 100 includes docking port 110 designed to receive electronic device 101. A notebook computer is any type of mobile computer such as a laptop, subnotebook, or tablet computer. For an alternate embodiment of the present invention, the notebook computer may be any base computer including, for example, a mobile computer, desktop computer, workstation, or server.

Electronic device 101 of Figure 1 is capable of operating in two modes. In a first mode, electronic device 101 is docked into computer 100. When in this mode, computer 100 is able to access data stored in electronic device 101, and the processor in electronic device 101 operates as the system processor of the notebook computer. In a second mode, electronic device 101 is undocked. When in this mode, electronic device 101 functions as a personal data assistant (PDA) or other hand-held, independently functional computer system. Electronic device 101 may hereinafter be referred to as a "core computer."

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The housing of core computer 101 of Figure 1 is designed to be docked into docking port 110 of computer 100. Core computer 101 may include user input and output capabilities integrated into the housing of the core computer, such as visual display 111 (which may be, for example, a liquid crystal display) to display information and to receive pen-based entries. For an alternate embodiment of the present invention, core computer 101 may include one or more sockets to attach additional, separate output devices such as, for example, a visual display, headphones, or a flash memory device. Core computer 101 may also include one or more sockets to attach additional, separate input devices such as, for example, a mouse, a tablet or visual display for pen-based entries, a microphone, a keyboard, or a flash memory device.

Core computer 101 may include a battery (either permanent or removable) to power the processor and other components of the core computer when the core computer is operating in its undocked, independent mode. When docked, the battery may be charged by the power supply of notebook computer 100 as described in more detail below.

Figure 2 is a schematic diagram of notebook computer 100 and core computer 101 when the core computer is docked in the notebook computer. Core computer 101 includes core processor 200 coupled to core hub 205. Core hub 205 enables communication between core processor 200 and core memory 210, core output controller 215, and core input controller 220 to which it is coupled. Core hub 205 is also coupled to interface 260. In addition, core computer 101 includes battery 255 coupled to interface 260. Notebook computer 100 includes notebook

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hub 230 to enable communication between core hub 205, via interface 260, and notebook memory 235, notebook output controller 240, and notebook input controller 245 to which notebook hub 230 is coupled. In addition, notebook computer 10 includes notebook power supply 250 coupled to interface 260.

Interface 260 of Figure 2 includes power and ground lines to couple power supply 250 (whether it be driven by a battery or an electrical outlet) of notebook computer 100 to core battery 255 of core computer 101. When docked, the power supply of notebook computer 100 may be used to charge battery 255. For an alternate embodiment of the present invention, the battery of the core computer is not rechargeable and may not be coupled to the power supply of the host computer when the core computer is docked.

By providing power to core processor 200, core hub 205, core memory 210, core output controller 215, and core input controller 220, battery 255 may used to power independent operation of core computer 101 when the core computer is undocked. In addition, battery 255 of Figure 2 may be used to power these components of core computer 101 when the core computer is docked. For an alternate embodiment, however, the components of the core computer are powered by the power supply of the notebook computer when the core computer is docked. For one embodiment of the present invention, battery 255 includes one or more rechargeable or unrechargeable removable batteries, such as AA batteries, or one or more permanent, rechargeable batteries.

Core output controller 215 of Figure 2 may be coupled to one or more output interfaces of core computer 101, such as a visual display, a speaker or headphone,

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an external storage device, or a wireless communication transceiver. Core input controller 220 may be coupled to one or more input interfaces of core computer 101, such as a mouse, a tablet or visual display for pen-based entries, a microphone, a keyboard, an external storage device, or a wireless communication transceiver. Similarly, notebook output controller 240 may be coupled to one or more output interfaces of notebook computer 100, such as a visual display, a speaker or headphone, or external storage device. Notebook input controller 245 may be coupled to one or more input interfaces of notebook computer 100, such as a mouse, a tablet or visual display for pen-based entries, a microphone, a keyboard, or an external storage device.

For one embodiment of the present invention, the functionality provided by core computer 101 when in undocked, independent operation as a hand-held device is less demanding on core processor 200 of Figure 2 than the demands made on the processor by notebook computer 100 when the core computer is docked. For example, core computer 101 may run relatively simple electronic calendaring, name/number addressing, and email viewing applications when undocked. In contrast, notebook computer 100 may additionally run spreadsheet, word processing, photo editing, video editing or playback, high resolution graphics gaming, or presentation applications when core computer 101 is docked. The difference in performance demands made on core processor 200 when undocked versus when docked, coupled with the more limited power supplied by core battery 255 versus that supplied by notebook power supply 250, may promote various design modifications.

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For example, for one embodiment of the present invention, core processor 101 of Figure 2 may operate in one of two or more modes. In a "high power" mode, core processor 101 operates at a nominal voltage and nominal frequency. In a "low power" mode, core processor 101 operates at a lower voltage, a lower frequency, or both a lower voltage and lower frequency in comparison to the nominal voltage and nominal frequency. When operating as the system processor of undocked core computer 101, core processor 101 may operate in the low power mode. When operating as the system processor of notebook computer 100 (i.e. with core computer 101 docked), core processor 101 may operate in the high power mode.

For an alternate embodiment of the present invention, the core processor may operate in a high power mode when operating as the system processor of undocked core computer 101. This embodiment may be found useful if, for example, additional processing power is needed or desired, according to user preference, or one or more other factors are considered such as available electrical power. For another embodiment, the core processor may operate in a low power mode when operating as the system processor of notebook computer 100 (i.e. with core computer 101 docked). This embodiment may be found useful if, for example, less processing power is needed or desired, according to user preference (e.g. to extend battery life), or one or more other factors are considered such as available electrical power or thermal management (e.g. processor overheating). The core processor may switch between the low and high power modes of operation during a single session, or the switch may require a shut-down and re-boot of the system.

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For one embodiment, interface 260 may additionally include a thermal interface between core computer 101 and notebook computer 100. This thermal interface may serve to dissipate heat from core processor 200 to notebook computer 100 (and to the ambient environment) when core processor 200 operates as the system processor of the notebook computer with core computer 101 docked.

For another embodiment of the present invention, core memory 210 of
Figure 2 may include a mini operating system to be booted and run on core
computer 101 when in its undocked, independent, hand-held mode of operation.
For this embodiment, notebook memory 235 may include a full operating system to
be booted and run on notebook computer 100 when core computer 101 is docked.
As used herein, the terms mini and full, as applied to an operating system, are
relative terms with respect to each other, wherein a mini operating system is smaller
in size and provides lesser functionality than a full operating system. The mini and
full operating systems may include the same core operating system. The mini
operating system may be a subset of the full operating system or may include
additional components to provide different and reduced functionality in comparison
to the full operating system, and to support fewer or different devices.

Core memory 210 of Figure 2 may include dynamic random-access-memory (DRAM) and flash memory or other electrically programmable read-only-memory (EPROM). The non-volatile memory of core memory 210 stores the mini operating system and application software that enables core computer 101 to operate in its independent, undocked mode. The volatile memory (e.g. DRAM) of core memory

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210 may function as the main system memory for core processor 200 when core processor 200 operates as the system processor of undocked core computer 101.

Notebook memory 235 of Figure 2 may include DRAM to function as the main system memory for core processor 200 when core processor 200 operates as the system processor of notebook computer 100 (i.e. when core computer 101 is docked). For an alternate embodiment of the present invention, core memory 210 of core computer 101, alone or in addition to notebook memory 235, functions as the main system memory for core processor 200 when core processor 200 operates as the system processor of notebook computer 100. Notebook memory 235 of Figure 2 may additionally include non-volatile storage such as a hard drive or CD-ROM.

Data received via core input controller 220 may be stored in core memory 210 of core computer 101 of Figure 2 when core computer 101 is operating independently while undocked. This newly received data may update stale data that was previously stored in core memory 210. This stale data may also have been previously stored in notebook memory 235 of notebook computer 100. In accordance with one embodiment of the present invention, when core computer 101 is docked into notebook computer 100, core memory 210 synchronizes with notebook memory 235. During the synchronization process, newly stored data that updates stale data in core memory 210 is provided to notebook memory 235, via interface 260, to similarly update the stale data in notebook memory 235. For one embodiment of the present invention, synchronizing the memory occurs

automatically when core computer 101 is docked. For another embodiment, synchronizing the memory occurs in response to a user request.

This invention has been described with reference to specific exemplary embodiments thereof. It will, however, be evident to persons having the benefit of this disclosure that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the invention. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.

CLAIMS

What is claimed is:

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|---|----|--------------------------|------------|
| 1 | 1 | An electronic device co | ımnrıçına: |
| 1 | 1. | All cicolionic action of | miphonig. |

- 2 a housing to enable the device to be docked into a notebook computer;
- 3 an interface disposed on a surface of the housing to enable
- 4 communication between the device and the notebook computer when
- 5 the device is docked; and
- a processor to operate as a system processor of the notebook computer
- 7 when the device is docked and to operate as a system processor of
- 8 the device when the device is undocked.
- 1 2. The electronic device of claim 1, further comprising an input controller to receive input data into the device when the device is undocked.
- 1 3. The electronic device of claim 2, further comprising core memory to store the input data when the device is undocked.
- 1 4. The electronic device of claim 3, further comprising an output controller to 2 provide output data from the device when the device is undocked.
- The electronic device of claim 4, further comprising a visual display disposed on a surface of the housing, the visual display being coupled to the input controller to provide the input data via pen-based entries on the display and

- being coupled to the output controller to provide the output data via the display.
- The electronic device of claim 1, further comprising core memory having
 stored thereon a mini operating system.
- 7. The electronic device of claim 1, further comprising a battery to provide
 power to the processor when the electronic device is undocked.
- 1 8. The electronic device of claim 7, wherein the interface is coupled to the battery to charge the battery when the electronic device is docked.
- The electronic device of claim 8, wherein the notebook computer is to provide
 power to the processor when the electronic device is docked.
- 1 10. The electronic device of claim 9, wherein the processor is to operate at a higher frequency and at a higher voltage when the device is docked than when the device is undocked.
- 1 11. The electronic device of claim 1, wherein the processor is to operate at a
 2 higher frequency and at a higher voltage when the device is docked than
 3 when the device is undocked.

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| 1 | 12. | A hase computer comp | rieina: |
| | 14. | A base computer comp | nong. |

- a docking port to receive a hand-held core computer having a processor
 to operate as a system processor of the base computer when the
 device is docked and to operate as a system processor of the core
 computer when the device is undocked; and
 an interface in the docking port to enable communication between the
 core computer and the base computer when the core computer is
 docked.
- 1 13. The base computer of claim 12, further comprising base memory having
 2 stored thereon a full operating system, the core computer comprising core
 3 memory having stored thereon a mini operating system.
- 1 14. The base computer of claim 12, wherein the interface is to couple a power supply of the base computer to a battery in the core computer to charge the battery and to provide power to the processor when the core computer is docked.
- 1 15. The base computer of claim 14, wherein the processor is to operate at a
 2 higher frequency and at a higher voltage when the processor operates as a
 3 system processor of the base computer than when the processor operates as
 4 a system processor of the core computer.

- 1 16. The base computer of claim 12, wherein the processor is to operate in one of 2 a high power mode and a low power mode according to user preference.
- 1 17. A method of operating a computer system comprising:
- 2 operating a processor as a system processor of a notebook computer
- when a core computer is docked in a docking port of the notebook
- 4 computer; and
- operating the processor as a system processor of the core computer
- 6 when the core computer is undocked.
- 1 18. The method of claim 17, further comprising synchronizing memory of the notebook computer with memory of the core computer when the core computer is docked.
- 1 19. The method of claim 17, further comprising charging a battery in the core computer when the core computer is docked.
- The method of claim 17, wherein operating the processor as a system

 processor of the notebook computer includes operating the processor at a

 higher frequency and voltage than when operating the processor as a system

 processor of the core computer.

The method of claim 17, wherein operating the processor as a system

processor of the notebook computer includes running a full operating system

on the processor, and operating the processor as a system processor of the

core computer includes running a mini operating system on the processor.

ABSTRACT OF THE DISCLOSURE

A notebook computer includes a docking port to receive a core computer. The processor of the core computer serves as the system processor for the notebook computer when the core computer is docked in the notebook computer. When the core computer is undocked, the processor serves as the system processor for the core computer. The core computer may boot a mini operating system when undocked, whereas the notebook computer may boot a full operating system when the core computer is docked. The processor of the core computer may operate at a lower voltage and at a lower frequency when serving as the system processor for the core computer than when serving as the system processor for the notebook computer. When the core computer is docked, the notebook computer memory is synchronized with the core computer memory, and a battery in the core computer is charged.

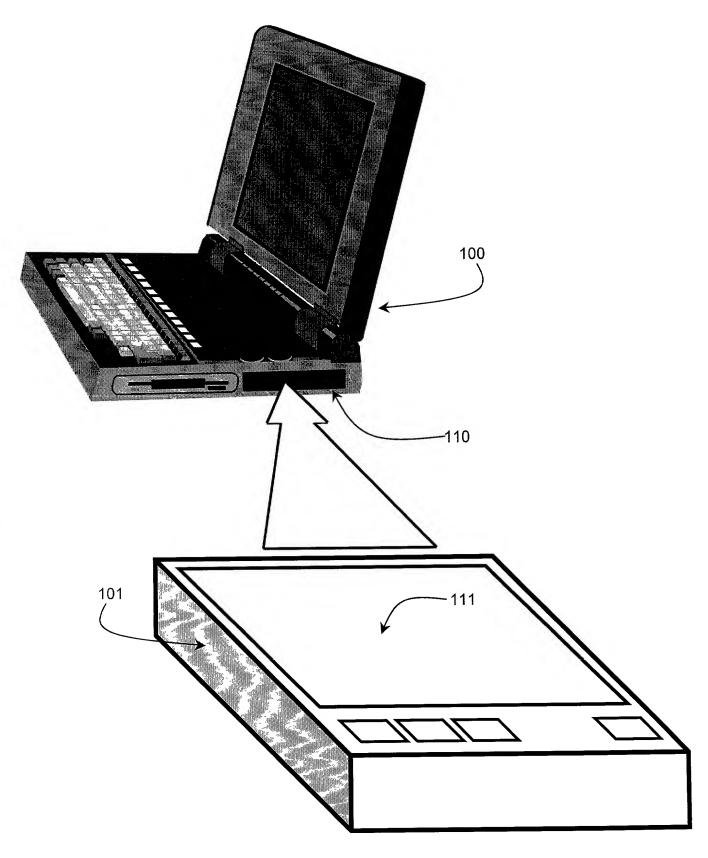


Figure 1

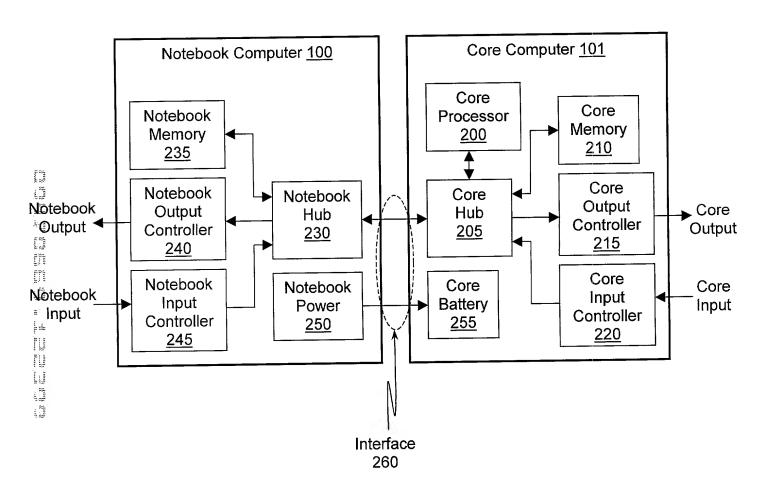


Figure 2

Attorney's Docket No.: 42390.P8085

PATENT

<u>DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION</u> (FOR <u>INTEL CORPORATION PATENT APPLICATIONS</u>)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled NOTEBOOK COMPUTER WITH INDEPENDENTLY FUNCTIONAL DOCKABLE CORE COMPUTER

the specification of which

| X_ | is attached hereto. was filed on | _ as |
|----|---|------|
| | United States Application Number | |
| | or PCT International Application Number | |
| | and was amended on | |
| | (if applicable) | |

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

| Prior Foreign Application(s | 1 | | Priori Clain | |
|--|--|--|---|---------------------|
| (Number) | (Country) | (Day/Month/Year Filed) | Yes | No |
| (Number) | (Country) | (Day/Month/Year Filed) | Yes | No |
| (Number) | (Country) | (Day/Month/Year Filed) | Yes | No |
| I hereby claim the benef United States provisions | | States Code, Section 119 elow: | (e) of a | ny |
| Application Number | Filing Date | | | |
| Application Number | Filing Date | | | |
| States application(s) listed of this application is not provided by the first paracknowledge the duty to patentability as defined in | ed below and, insofar as disclosed in the prior U agraph of Title 35, Unite disclose all information In Title 37, Code of Federal the filing date of the prior the pri | States Code, Section 120 the subject matter of eac nited States application in d States Code, Section 1 known to me to be material Regulations, Section 1 prior application and the na | h of the the mai 12, al to 1.56 whice | claim nner ch |
| Application Number | Filing Date | Status patented, pending | , abando | |
| Application Number | Filing Date | Status patented, | ahando | |

I hereby appoint the persons listed on Appendix A hereto (which is incorporated by reference and a part of this document) as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to <u>David Kaplan</u>, BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, 12400 Wilshire Boulevard 7th Floor, Los Angeles, California 90025 and direct telephone calls to <u>David Kaplan</u>, (408) 765-1823.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

| Full Name of Sole/First Inventor Kelan C. Silvester | |
|---|---------------------|
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